GAIN

Gateway for Accelerated Innovation in Nuclear

Overview

Kemal O. Pasamehmetoglu
INL Associate Laboratory Director for Nuclear Science and Technology
Director of GAIN

DOE-NRC Advanced Reactors Workshop

June 7-8, 2016

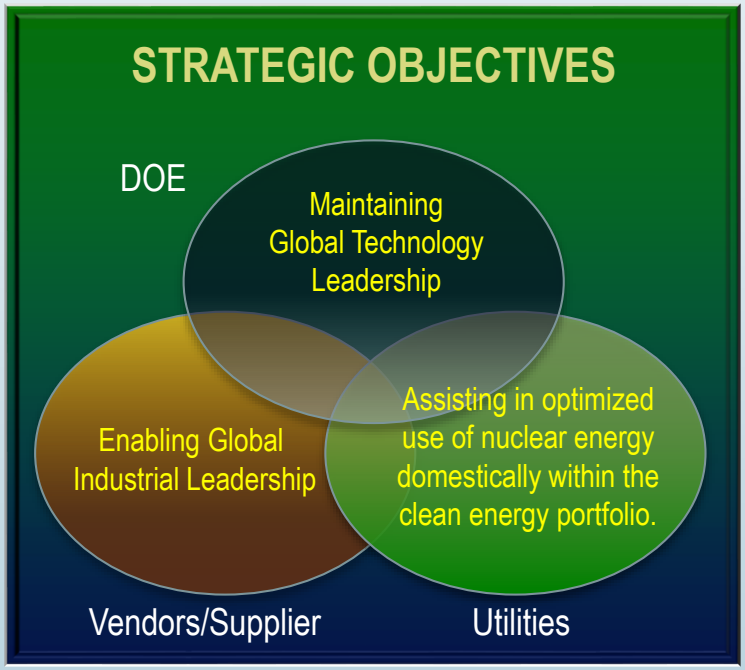
Idaho National Laboratory

OAK RIDGE National Laboratory

Argonne NATIONAL LABORATORY

GAIN Initiative is Aimed at Simultaneous Achievement of Three Strategic Objectives

- **GAIN** is based on the following premise:
  - National and global demand for nuclear energy is increasing and U.S. global leadership is eroding
  - There is a sense of urgency with respect to the deployment of the innovative nuclear energy technologies
  - An effective public-private partnership is required to achieve the goals
- **GAIN**'s objective is to enable rapid and cost-effective development of innovative nuclear energy technologies towards market readiness
  - Bridging the gap between technology leadership and industrial leadership combined with optimized domestic deployment.
- **GAIN** is a public-private partnership and is implemented as the organizing principle for the *relevant* federally funded nuclear energy RD&D programs



GAIN (Gateway for Accelerated Innovation in Nuclear) is an administration initiative announced in November 2015 as the organizing principle towards timely achievement of the strategic goals.

GAIN
Gateway for Accelerated Innovation in Nuclear

With GAIN, We Are Exploring a New Model For Faster and More Cost-Effective Innovation Cycle for Nuclear Energy

SEQUENTIAL PROGRESSION FOR INNOVATION

DOE
selects and develops promising innovative technologies

VENDORS/SUPPLIERS
convert a subset of the technologies into commercial products.

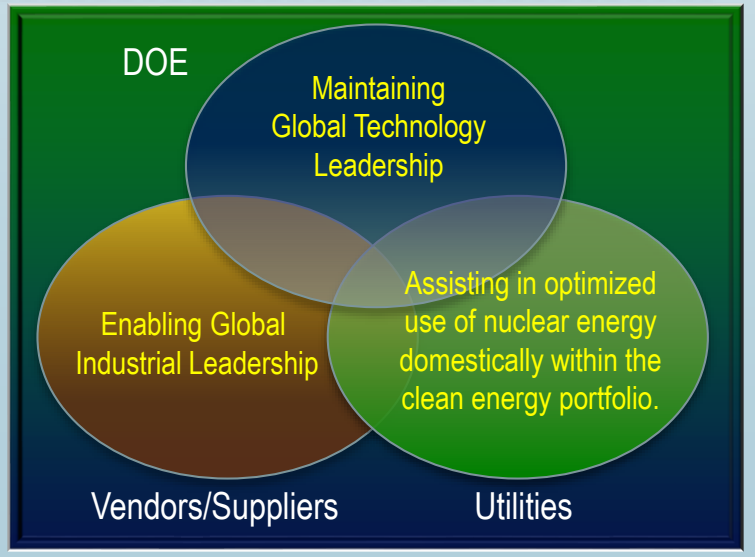
UTILITIES
deploy a subset of the commercial technologies.

For complex technologies such as nuclear energy, the sequential model becomes less effective when federal funding is limited and the technology maturation cycle is long.

GAIN

INTEGRATED PROGRESSION FOR INNOVATION TO ACHIEVE ALL 3 STRATEGIC OBJECTIVES SIMULTANEOUSLY

DOE-VENDORS-UTILITIES
Public-Private Partnership Model
Optimized strategy for development, demonstration and deployment of innovative technologies for faster and more cost-effective innovation cycle.



What are the Problems/Issues*?

- Time to market for nuclear technology is too long.
- Facilities needed to conduct the necessary RD&D activities are very expensive to develop and maintain.
- Capabilities (e.g., facilities, expertise, materials, and data) at government sites have not been easily accessible by the entities trying to commercialize innovative systems and components.
- Technology readiness levels vary – requiring differing research and funding opportunities.
- Many technology developers require assistance working through the regulatory process for new nuclear technologies.

**Lack of investment issues and not technical or policy issues*

What do we need to do?

- Provide nuclear innovators and investors with a single point of easy access to the broad range of capabilities – people, facilities, materials, and data – across the DOE complex.
- Provide focused research opportunities and dedicated industry engagement, ensuring that DOE-sponsored activities are impactful to stakeholders working to realize the full potential of nuclear.
- Expand upon DOE's work with the Nuclear Regulatory Commission (NRC) to assist technology developers through the regulatory process.

What is the DOE initiative?

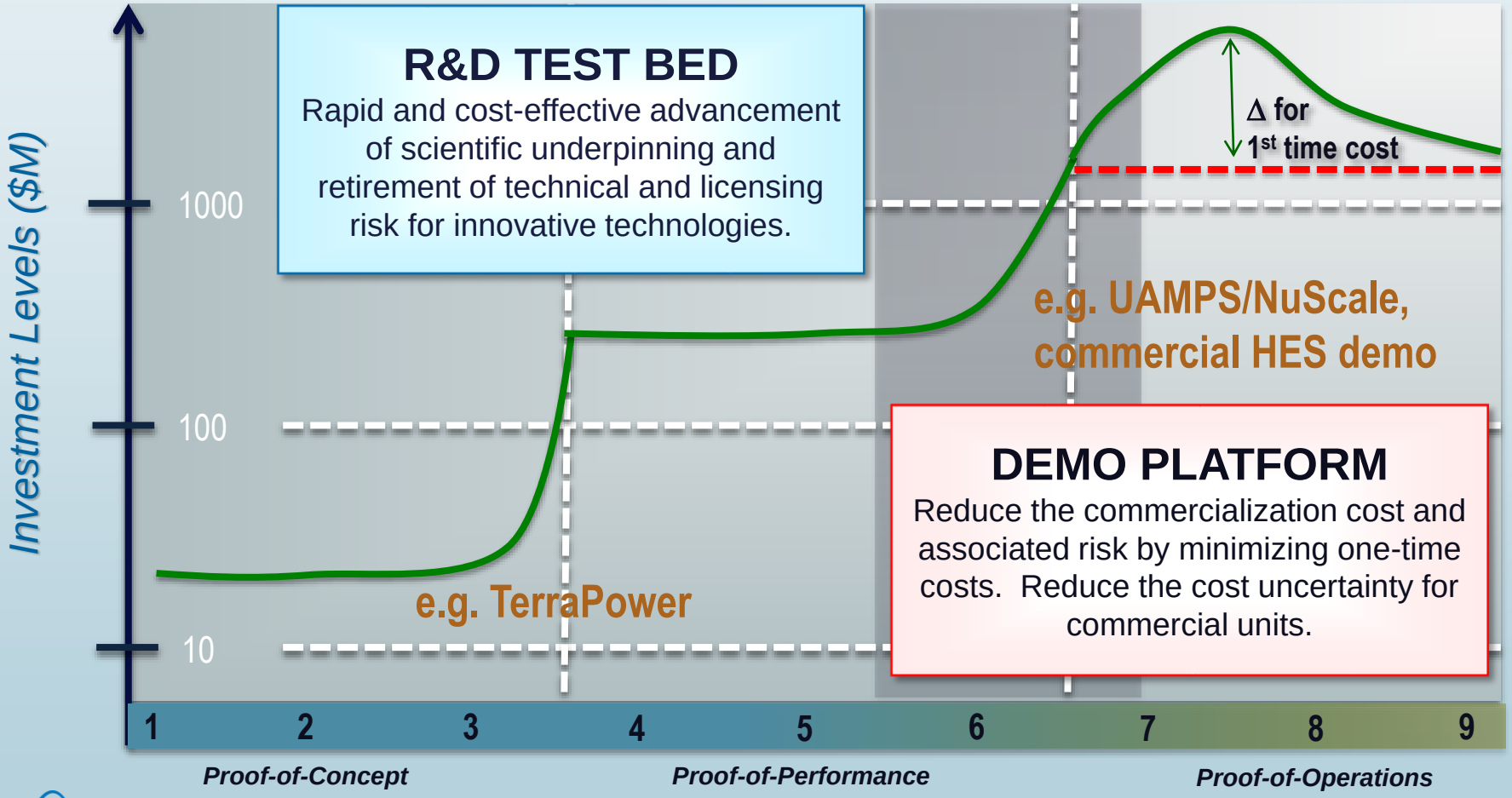
- Public-private partnership headquartered at INL and managing a distributed test-bed and demo platform.
- Dedicated to accelerated commercial readiness of innovative technologies

Government Assets:

- Tens of $B in DOE and partner assets *(experimental and computational)*
- Multi-$B in yearly investments for R&D and infrastructure
- $12.5 B in loan guarantees
- Small Business vouchers
- Expertise *(thousands of FTE/yr.)*

DOE recognizes the magnitude of the need, the associated sense of urgency and the benefits of a strong and agile public-private partnership in achieving the national goals.

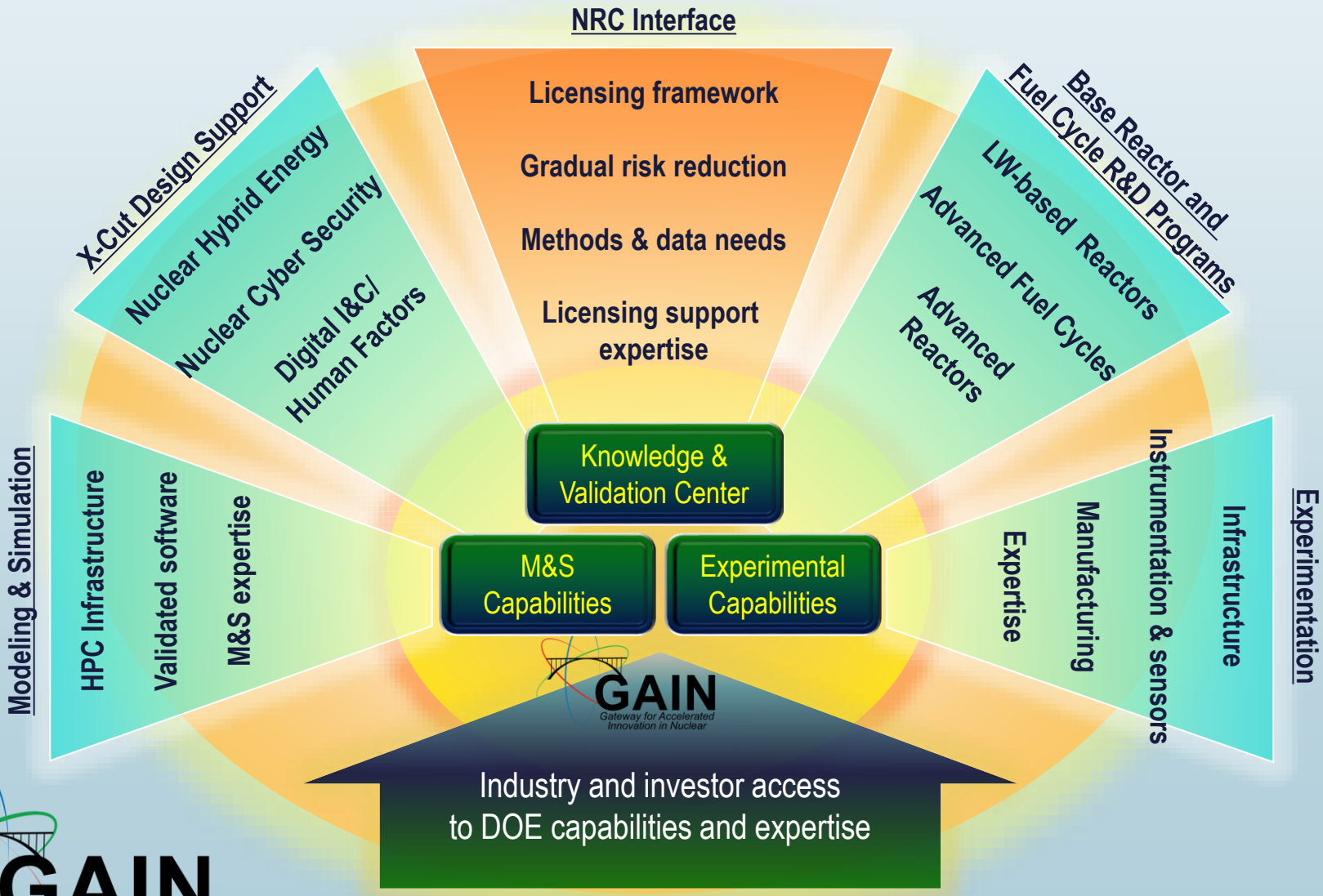
Crossing the two "Valleys of Death" in a rapid and cost-effective manner



GAIN
Gateway for Accelerated Innovation in Nuclear

*Refers to the concept of incremental reduction in licensing risk. The definition needs to recognize that technology development proceeds licensing development.

GAIN is the Organizing Principle for DOE-NE RD&D Programs Through A Proposed Comprehensive Systems Analysis



GAIN
Gateway for Accelerated Innovation in Nuclear

Technology Specific Workshops

WORKSHOPS DEFINITION

- GAIN in partnership with NEI and EPRI is planning for a series of technology workshops with vendors/investors.
  1. Molten salt reactor technologies
  2. Fast spectrum reactor technologies (liquid metal, gas)
  3. High-temperature gas reactor technologies
- Reach out to all private stakeholders in specific technology areas
- Timeframe work the workshops: June-July, 2016
  - Results to impact scope and funding decisions in the base programs, starting in FY'17

WORKSHOP OBJECTIVES

- Discussion R&D needs by vendors/investors
- Identification of non-design specific R&D needs that benefit multiple designs
- Identifications of the R&D infrastructure gaps
- Prioritization of the needs
- Discussion on the definition of "demonstration" and strategies to complete demonstration

EXAMPLES FOR NON-DESIGN SPECIFIC R&D AREAS (MOLTEN SALT TECHNOLOGIES)

- Chemical-thermodynamic databases
- Fission-product management strategies
- Fission-gas management strategies (e.g. tritium)
- Reactivity (fissile/fertile inventory) management
- Corrosion management
- Multi-physics modeling for liquid fueled systems

The results of each workshop will be documented as a set of recommendations to DOE to be incorporated into the base RD&D programs.

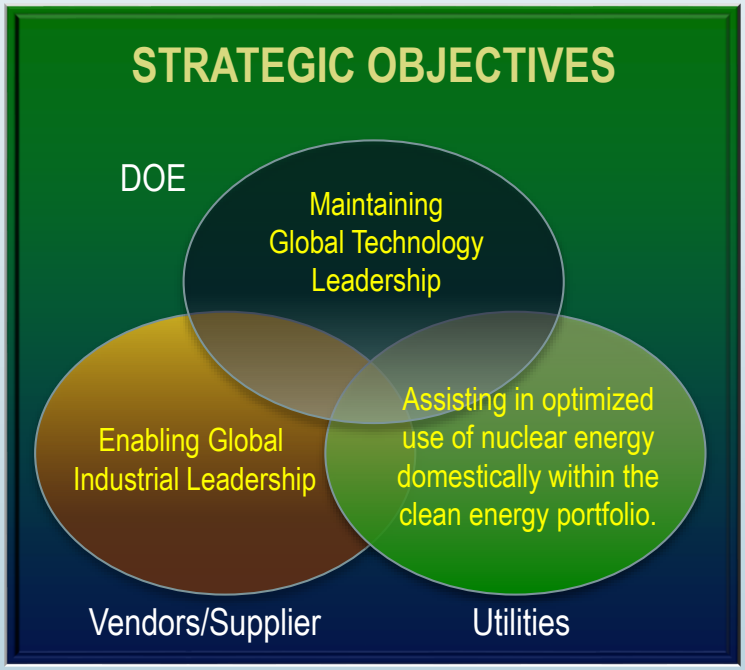
Depending upon the interest, technology-specific working groups will be established jointly between DOE and Industry, in order to

- Monitor progress
- Decide on course corrections
- Rapidly transfer progress to design decisions

GAIN
Gateway for Accelerated Innovation in Nuclear

Summary & Conclusions

- GAIN is establishing a public-private partnership aimed at simultaneously achieving 3 strategic objectives.
- GAIN is an initiative that will be used as the organizing principle for the relevant NE funded programs
  - GAIN is NOT a program with a separate explicit funding
- We are making rapid progress in defining the details and execution of GAIN towards the strategic objectives
  - Timely **stakeholder feedback** is critical to GAIN's success
- Upcoming technology centered workshops will provide critical input towards aligning the NE funded base programs towards the needs of industry/investors
  - Strong participation is requested
- Due to federal budget cycles,
  - FY'16 is the year of definition,
  - FY'17 is the year of transition (with partial execution commensurate with budget allocation), and
  - FY'18 and beyond will be the full execution phase.



GAIN (Gateway for Accelerated Innovation in Nuclear) is an administration initiative announced in November 2015 as the organizing principle towards timely achievement of the strategic goals.

GAIN
Gateway for Accelerated Innovation in Nuclear